White Paper

Report ID: 113337

Application Number: PF-50434-14

Project Director: William H. Dunlap

Institution: New Hampshire Historical Society

Reporting Period: 10/1/2014-9/30/2016

Report Due: 12/31/2016

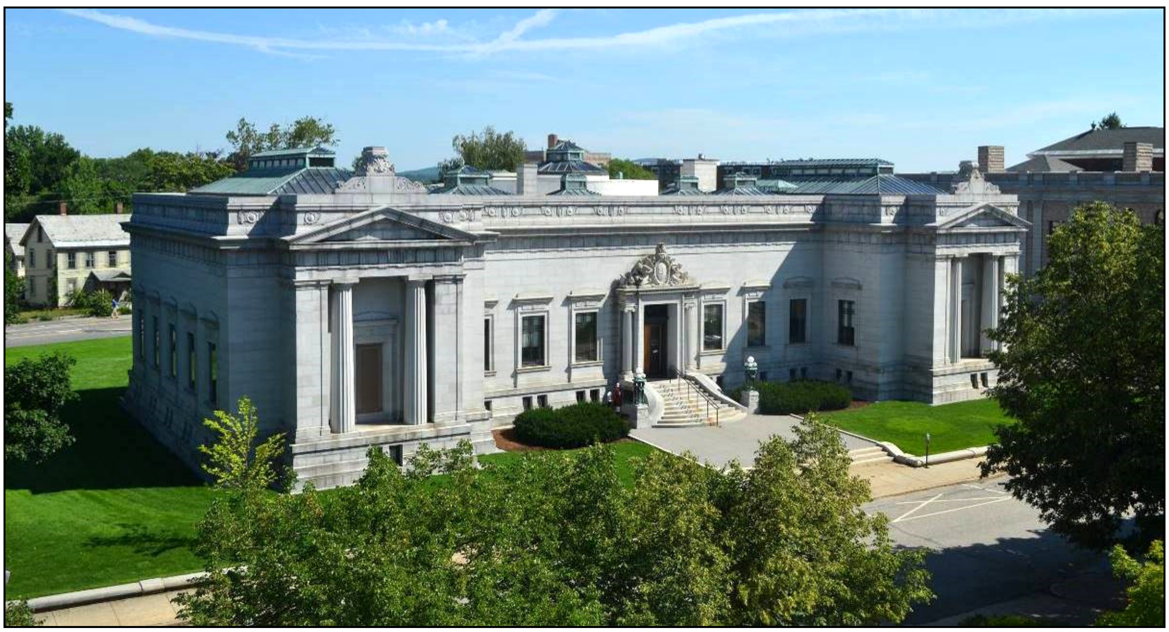
Date Submitted: 12/27/2016

WHITE PAPER:

NEW HAMPSHIRE HISTORICAL SOCIETY

IMPROVING INTERNAL ENVIRONMENTAL CONDITIONS TO PRESERVE NEW HAMPSHIRE COLLECTIONS

DECEMBER 2016



NATIONAL ENDOWMENT FOR THE HUMANITIES SUSTAINING CULTURAL HERITAGE COLLECTIONS GRANT
PF-50434-14

JAMES L. GARVIN, PRESERVATION CONSULTANT

WHITE PAPER

NATIONAL ENDOWMENT FOR THE HUMANITIES
DIVISION OF PRESERVATION AND ACCESS
SUSTAINING CULTURAL HERITAGE COLLECTIONS PROGRAM
IMPROVING ENVIRONMENTAL CONDITIONS TO PRESERVE NEW HAMPSHIRE COLLECTIONS
GRANT ID NO. PF-50434-14

JAMES L. GARVIN

Summary

As a recipient of a Sustaining Cultural Heritage Collection Program grant, the New Hampshire Historical Society faced the task of rehabilitating its 1911 headquarters building to attain the best possible internal conditions for the preservation of nationally significant library and museum collections in storage and on exhibit within the building. Designed by Boston architect Guy Lowell, the building is monumental in character and had sophisticated mechanical and electrical systems for a structure designed in the first decade of the twentieth century. Ultimately, the presence of these systems permitted a program of interior rehabilitation that would have been more difficult in a less technically advanced structure of the same era.

The building is a two-story structure that was designed to appear as a single story building from the exterior. To provide natural light to the second story, architect Lowell placed eleven skylights on the roof, accounting for about 40% of the total roof surface area. The upper skylight structures are framed with riveted steel trusses and are glazed with wire-reinforced glass. Below each skylight is a laylight, or glazed ceiling area, filled with horizontal sashes holding frosted quarter-inch polished plate glass. The two major rooms on the second story are an exhibition gallery on the east and the library book stacks on the west.

The building is listed in the National Register of Historic Places as a contributing property in the Concord, New Hampshire National Register Civic District.[1] Since this project was supported in part by federal funding, National Register listing meant that the rehabilitation was required to adhere to the *Secretary of the Interior's Standards for Rehabilitation*. Among the ten *Standards for Rehabilitation* are requirements that the historic character of a property shall be retained and preserved; the removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property shall be avoided; and that new additions and adjacent or related new construction shall be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment will be unimpaired.

[1]Entered 12/22/1983; National Register Ref. No. 83004203.

Most of the physical changes that were proposed in the grant application to the Sustaining Cultural Heritage Collection Program, and are described below, were completed by October 2015. The following twelve months of the grant period, through the end of calendar year 2016, were devoted to monitoring the behavior of the mechanical and electrical systems, the internal environment of the building, and the effects of the grant-funded changes upon both the building and its contents.

Brief History of the Building

Donated by philanthropist Edward Tuck (1842-1938), a native of Exeter, New Hampshire, who lived in Paris, the building incorporated the finest and most imperishable of materials—Concord granite; Italian, French, and American marbles; cast bronze; arts and crafts floor tiles; and mahogany. Donor Edward Tuck intended the Society's building to symbolize the importance of history and the Society's commitment to protect the legacy of New Hampshire's past. The symbolic frontispiece of the structure is an Ionic doorway surmounted by a monumental sculptural group representing Ancient and Modern History, designed by New Hampshire native Daniel Chester French (1850-1931) and carved from a single, flawless block of Concord granite from the local Swenson quarry.

The building was designed by Boston architect Guy Lowell (1870-1927). Like many prominent American architects of his day, Lowell had supplemented his New England education at Harvard and the Massachusetts Institute of Technology with several years of rigorous training at the École des Beaux Arts in Paris. That training imparted complete familiarity with all architectural vocabularies, the symbolic meaning that attached to the classical orders, and the proper ornamentation that pertained to each order. The building was deliberately given a classical identity, expressing a symbolic architectural language as it was understood in the early twentieth century. Despite its classical garb, however, the building was technologically advanced for its time.

Taking advantage of a municipal electric service that had been introduced to the state capital about fifteen years earlier, the building was equipped with the most modern technologies available in the early twentieth century. The building had a steam heating system supplied by two internal coal-fired boilers. To ensure the gentle distribution of purified warm air in the wintertime while maintaining a beneficial rate of air exchange in the building, the steam heating system of the building was supplemented by an electrified ventilating system. A large central fan drew outside air into the building through a bank of air filters, pre-warmed the air in a chest of steam coils, and then delivered the warm air to each of the building's radiators in window embrasures or in floor or wall cabinets for final heating, simultaneously distributing fresh air to every chamber. Stale air was vented through the roof of the building by means of registers and ducts in the walls and through pneumatically-controlled vents in the tops of the skylight enclosures. In addition to its heating and ventilating system, the building was provided with such additional utilities as a central vacuuming system and an electric book elevator.

Architect Lowell took advantage of the rapid improvement of electric lighting technology in the early twentieth century to supplement the natural illumination of the building through its plate glass windows and skylights. The building is furnished with architect-designed bronze ceiling lights, standards, chandeliers, and brackets that combine sculptural detailing in metal with electric illumination. In addition, hidden electric lights provide diffused lighting in several areas, notably the perimeter of the low dome that crowns the second story of a central rotunda. The laylights (ceilings glazed with frosted plate glass panels) beneath the principal skylights could also be illuminated from above, making them a source of diffused light at night, as they were during daylight hours.

Description of the physical evolution of the property

The essential architectural characteristics of the New Hampshire Historical Society's building remain unchanged from the time of the building's dedication in 1911. Except for changes in shade trees and ornamental shrubs over time, the building has had no exterior additions or alterations from the date of its opening except for the addition of a wheelchair ramp and a chiller behind the building for air conditioning. Because the building holds the single most significant collection of printed, manuscript, and pictorial materials relating to New Hampshire history, and an unparalleled collection of New Hampshire fine and decorative arts, the Society has, however, undertaken periodic changes to the structure's mechanical systems from the 1930s to the present day in order to meet advancing standards of collections care.

A rehabilitation project in 1996, funded in part by a challenge grant from the National Endowment for the Humanities, provided barrier-free access by means of the installation of a new elevator and chair lift, as well as an outside wheelchair ramp, making the building fully compliant with the Americans With Disabilities Act.

From its dedication until 1939, the building was heated internally by steam generated by two large horizontal "locomotive" boilers located in the eastern basement. Like many buildings of the late 1800s and early 1900s, especially after electricity was available to power electric motors, the building was given a "direct-indirect" steam system that was intended both to heat the building and to provide ventilation and fresh air both in summer and winter. The "direct" aspect of the system was an arrangement of cast iron two-pipe radiators, especially in the basement, that heated the surrounding spaces by the direct radiation of heat from their coils. The "indirect" aspect was a provision for outside air to be drawn into the building's basement by a large electrically driven fan, pulled through a chamber fitted with cloth filters and through a second chamber filled with steam radiators that gently tempered the outside air during cold weather. This pre-warmed air was then blown through a system of sheet iron ducts to the principal rooms of the first and second stories. There, the tempered air was discharged through the base of cabinets beneath the building's windows, where additional cast iron radiators raised the temperature of the air to comfortable levels.

The system was intended to provide fresh air throughout the building, attaining air quality standards that were designed to address the negative effects of carbon dioxide in institutional buildings. The air circulation system was especially valued in hot weather, when the circulating fan could be run at night to pull cool outside air into the building. Heated summertime air trapped in the building during the day was vented through pneumatically controlled sashes in a series of skylights that both illuminated the second story of the building and acted as exhaust ports at the top of the structure.

In 1939, a central steam plant was built in downtown Concord to supply steam to customers through mains buried beneath the principal streets. The New Hampshire Historical Society chose to make use of this new utility.

Removal of the boilers and the substitution of steam from a distant plant of the Concord Steam Corporation in 1939 was beneficial to the building and its collections. The conversion removed the tons of coal that was formerly stored in basement bins along the north wall of the boiler room, freed space in the former boiler room for storage of collections, eliminated the need to maintain an attendant or janitor on the premises on a full-time basis during the winter to tend the boilers and remove ashes, and generally improved the cleanliness of the building.

However, the retention of the original two-pipe steam heating system, now fed from outside the building, did not eliminate certain characteristics that continued to be of concern with respect to the protection and longevity of the contents of the building. The cast iron radiators installed in the building in 1911 were supplied with steam through a system of wrought iron pipes that extended from the point of entry of the steam supply to all parts of the building. Some of these pipes ascended to the second story through chases in the masonry walls, and the presence of steam and condensate in pipes throughout the building posed a threat to the collections and the building itself as the steam system aged. Steam and condensate leaks caused by eroding pipes were a recurring problem in the Society's building for some forty years.

Climate Control Changes

The Society addressed this threat in 2015. Aided by a 2014 grant from the Sustaining Cultural Heritage Collection Program of the National Endowment for the Humanities and additional grant monies from the New Hampshire Land and Community Heritage Investment Program, the Society completely revised its heating system, eliminating almost all possibilities of leakage throughout the building.

The New Hampshire Historical Society initially proposed to remove the two-pipe steam heating system from its building and to substitute a forced hot water radiation system. The hot water would be generated by an efficient, natural-gas-fired boiler or boilers, potentially supplemented later by geothermal and/or solar heat sources. The water would be distributed through flexible tubing inserted through or adjacent to the existing disused wrought iron steam pipes to deliver the hot water to the existing radiator cabinets located throughout the building. The proposed flexible tubing would be PEX, a cross-linked polyethylene formulation that is now used widely in heating and for water supply, and is especially favored in areas where access to and maintenance of the hot water conduits may not be easy or even possible.

Studies carried out in preparation for the grant proposal to NEH in the autumn of 2013 suggested an alternative approach to heating the building, one that could be combined with the system of air-conditioning that has been in use in the building since 1996. Advice from the Northeast Document Conservation Center drew attention to the fact that the building fortuitously contains an air duct network that had served the original direct-indirect steam radiation system.[2]

This suggested a heating method that would use natural-gas-fired hot water boilers and heat exchangers to mix outside and recirculated inside air in a bank of air handlers. The warmed air would be filtered and tempered for proper relative humidity and then delivered throughout the building by way of the original ductwork of 1911, without the presence of steam or condensate anywhere in the system. These ducts were found to be of sufficient capacity to convey both heated air and chilled air (which is denser) throughout the building, and in fact have been used since 1996 to carry cooled air in the summertime. This alternate design would avoid the necessity, expense, and potential threat to the building and collections of circulating hot water to all parts of the structure.

This system of gas-fired boilers and air handlers was installed in 2015. The boilers are vented through the building's original chimney, which was provided for the 1911 steam boilers but not used since 1939.

[2] Michael K. Lee, "Environmental Assessment of the New Hampshire Historical Society Library Building," Northeast Document Conservation Center, November 29, 2013.

The original steam heating system is disconnected but largely retained in place to preserve the components of the building's original heating technology of 1911, thus responding to the urging of the *Secretary's Standards* that "distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved."

Conversion of the heating and cooling system from steam radiators to forced air permitted a precise regulation of the relative humidity in the building throughout the year. For the first time since 1911, the building now has full climate control for the benefit of the collections and the comfort of human occupants. The system and its controls have been monitored manually and through a distributed system of HOBO and PEM2 dataloggers until the conclusion of the grant period in December 2016. Internal conditions will continue to be monitored hereafter for the benefit of the collections and the building envelope.

Ultraviolet Radiation, Control of Visible Light, and Heat Loss and Gain through Skylights

The second story of the building, which includes the exhibition galleries and the principal book stacks, was designed to receive all of its natural light through skylights, making the structure appear as a one-story building from the exterior. A major concern regarding the internal environment of the New Hampshire Historical Society's building has been the pervasiveness of ultraviolet radiation. On the second story, this ultraviolet infiltration was freely admitted through the skylights, especially the large glazed strictures above the library stacks on the west and the exhibition gallery on the east. In 2013, the Society commissioned an "Environmental Assessment of the New Hampshire Historical Society Library Building" by the Northeast Document Conservation Center (NEDCC). The NEDCC report recommended modifying all existing skylights to control heat loss/gain and reduce the visible light and ultraviolet exposure of the collections that are stored or exhibited beneath the skylights.

At the same time, the skylights are considered to be character-defining elements of the National Register-listed building, partly visible from the street and more fully seen from neighboring buildings, including the New Hampshire State House, the State Library, and the Legislative Office Building (see cover photo). In response, the Society's consulting building scientists devised thermal barriers that were inserted in the skylight enclosures above the laylight sashes, making these barriers invisible to viewers from the outside or inside. The new thermal barriers have an insulation R-value value [resistance to heat transmission] of approximately 60, compared to the approximate R-value of 1.5 for the original skylights.

To compensate for the loss of natural light through the skylights, the rehabilitation of 2015 inserted energy-efficient LED (light-emitting diode) sources selected for their replication of the visible spectrum of natural light in color and intensity, and capable of being dimmed or brightened as desired. LED light sources do not normally emit ultraviolet radiation, but they may emit levels of visible light that are harmful to collections; therefore, the capability to dim the LED arrays is important to the preservation of the objects below them. As recommended by the Northeast Document Conservation Center's "Environmental Assessment of the New Hampshire Historical Society Library Building," levels of visible light from both the skylight LED arrays and the LED exhibition lighting are carefully controlled to minimize damage to items on display.

The ability of LED sources to replicate the visual appearance of natural daylight was greatly enhanced by the timely introduction of new types of light-emitting diodes as the project was being designed. The LED light sources take the form of thin sheets attached to the bottoms of the thermal barriers. They are Verbatim Model PN24-W53-C50-010 dimmable panels with a color temperature of 5000°K., closely replicating the visible spectrum in daylight. In the main exhibition gallery on the east side of the building's second story, all exhibition lighting is activated by motion detectors, keeping the room dark until visitors approach, thus conforming to recommendations for limiting exposure of collections to visible light as well as ultraviolet radiation.

As noted above, the 1911 design allowed the frosted glass laylight panels to be illuminated at night by incandescent bulbs arrayed within the skylight enclosures. The use of LED panels to provide daytime illumination of the second floor maintains the principle of the 1911 system, except that the system of electric illumination is used during the day as well as at night. When the skylights are not illuminated, the collections that are stored in the second story of the building, including the majority of the Society's printed materials, are now protected in darkened areas for the first time in more than a century. As noted above, exhibition lighting is controlled by motion detectors, and is turned off until viewers approach the galleries.

The exclusion of natural light from all parts of the second story has completely eliminated ultraviolet radiation from this floor except in the upper rotunda, where natural light has been retained because of the complex architectural design of the bronze and glass rotunda skylight. The upper rotunda thus provides a baseline for the original intensity of ultraviolet radiation on the second story. On a cloudless day at noontime, the upper rotunda registers light readings as high as 600 lux and ultraviolet readings as high as 94 microwatts per lumen (µW/lm). By contrast, the nearby corridors and staircase, and all the rooms and galleries of the second story, now register readings of 0.00 µW/lm.

The insertion of thermal and light barriers in the second-story skylights had a secondary benefit of greatly reducing energy consumption in the building. The eleven original single-glazed skylight structures were the major source of wintertime heat loss and summertime heat gain in the Society's building. The new thermal barriers have an insulation R-value of approximately 60 as opposed to the approximate R-value of 1.5 for the original skylights, which hardly retarded the transmission of heat either in the summer or winter. As shown by infrared scanning, wintertime heat loss through the skylights was previously uncontrolled. In the summertime, the skylights radiated heat downward into the building interior, largely because the pneumatically controlled vents in the skylights were not usually activated in recent years to release solar-heated air. Dataloggers installed in the larger skylight enclosures registered temperatures as high as 150º F. on summer days. The radiation of this heat downward through the quarter-inch plate glass laylights at ceiling level taxed the building's previous air conditioning system and resulted in high cooling costs during sunny weather.

The thermal permeability of the skylights has now been eliminated, yet the interior and exterior appearance of the features is unchanged and the inserted barriers are a reversible treatment. To prevent excessive summertime heat gain in the upper skylight structures, panels in their clearstories are now fitted with louvered vents to release warm air.

Potential for Condensation in a Humidified Building

The flat roof of the Society's headquarters building is composed of a reinforced concrete slab supported by a framework of rolled steel members. While the concrete slab itself is not susceptible to being insulated, a base of rigid insulation was applied on top of the concrete slab when the building was provided with a new PVC (polyvinyl chloride) roof covering in 1996, providing some added resistance to heat transfer through the slab.

Investigation of the building by the project's engineering consultants, H. L. Turner Group and Turner Building Science and Design, disclosed, however, that an air space approximately sixteen inches in height exists between the bottom of the concrete roof slab and the top of the framing that supports the ornamented plaster ceilings of the second story. The Turner Group concluded that "this space could be easily filled with a properly designed insulation system. This would give the roof an R-value [resistance to heat transmission] of approximately 60," a great improvement over the current characteristics of the roof, which approximate R-10.[3]

Pursuing this recommendation, the project team examined the structure and analyzed the contract drawings for the building, prepared in 1909 by the office of Guy Lowell, architect. The purpose of this investigation was to determine the continuity or discontinuity of air spaces above the plastered ceilings and the feasibility of inserting thermal insulation into those spaces.

Investigation showed that the spaces in question probably exist above nearly the entire expanse of the second story ceilings of the building. It was found, however, that this space is accessible only around the perimeter of the skylight that illuminates the building's eastern second-story exhibition gallery. In other areas of the second story, details of the roof framing and skylight enclosures differ from those in the eastern gallery. The curbs around the laylights in these areas provide no gap or opening below the ceiling, nor is there any other access above the ceilings without cutting through the ornamented ceiling plaster and the expanded metal lath that supports the plaster.

Examination of the 1909 drawings for the building further disclosed that the ceiling and roof areas above the second story are divided into three separate zones by principal walls or partitions that extend from the basement through the first and second stories and act as load-bearing walls for areas of the roof framing. These partitions divide the areas above the ceilings into discrete zones and would prevent access from one zone to another for the purpose of inserting thermal insulation above the ceilings. Insulation could theoretically be inserted above the ceilings of each zone, but separate access ports would have to be cut through the ceiling plaster in each zone.

In deference to the *Secretary of the Interior's Standards for Rehabilitation*, the proposal to insert thermal insulation above the second-story ceilings was reconsidered. The *Standards* require that "distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved" and that "new additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property." These guidelines influenced the decision to abandon the idea of inserting thermal insulation

---

[3] H. L. Turner Group, Inc. and Turner Building Science and Design, LLC, "Energy Evaluation Report, New Hampshire Historical Society, <u>Tuck Library Building</u>, 30 Park Street, Concord, New Hampshire," November 30, 2010, p. 13.

above the ceiling. For the reasons described above, no method of reaching the voids above the ceilings without opening up and removing areas of original ceiling plaster was identified, except above the eastern gallery.

Another consideration also weighed against the insertion of thermal insulation in these areas. In observation of the principle that any treatment of the building must be reversible, the use of an insulation that forms its own vapor barrier upon hardening, such as a closed-cell foam, was considered but discountenanced. Such material could probably be injected to create a thermal barrier above the expanded metal lath and plaster in each of the three structural zones of the roof, but once installed, rigid foam could not be removed.

With insulating options apparently limited to loose forms of insulation that do not have integral vapor barriers, the possibility of wintertime condensation above inserted insulation was considered a crucial issue, especially, as described below, because the building is now more thoroughly and evenly humidified in the winter months for the benefit of the collections than it has been for the past century. All members of the project team were concerned that design and installation of an effective and reversible vapor barrier above the ceilings would pose an additional hazard to the ornamental plaster of the second-story ceilings.

Because the building is now more uniformly humidified than before, the possibility of condensation even in uninsulated spaces above the ceilings remains a matter of concern. For this reason, these spaces will be monitored by dataloggers in the future to confirm that their temperature remains above the dewpoint and that no condensation occurs unseen above the ceiling plaster.

It is possible that during the coldest days of winter, inaccessible areas below the roof slab, or even within the masonry walls of the building, could cool below the dewpoint of the humidified air within the building. Provision of a vapor barrier or retarder above the second-story ceiling plaster or the wall plaster of the building was not customary or technically easy in 1910, and would have been unnecessary in a building heated with steam and not provided with artificial humidification. Based on measurements taken with dataloggers in the winter of 2015-6, future wintertime relative humidity levels in the building may be expected to be maintained at 30% or above. Under these new conditions, it will be imperative to monitor temperature, relative humidity, and dewpoint throughout the coldest weather to detect any threat of condensation. This monitoring will continue year-round for the foreseeable future.

Compromise between Ideal Conditions and the Capacity of a Historic Building

As it began to design this project, the New Hampshire Historical Society was in possession of a report from the Northeast Document Conservation Center that outlined ideal conditions for museum, library, and manuscript collections. The 2013 report, "Environmental Assessment of the New Hampshire Historical Society Library Building," also pointed out the difficulty of attaining or maintaining such conditions in an existing building that was built in an age when such conditions were hardly imagined:

> A very important element in any long-term storage plan is the evaluation of the building envelope and its ability to maintain a stable environment. One needs to determine if the building is tight enough and sufficiently insulated to maintain a uniform stable climate. Evaluating whether there are multiple points of leakage within the building envelope is

> important. A porous space will never provide a stable environment, unless a comprehensive program is established to modify the building. It is important to know what the limitations of the building's space are and which environmental set points the space is able to consistently maintain at a reasonable operating cost. This will clearly define what type of collection is appropriate to house in the internal space(s). Maintaining consistent environmental set points for a given collection must be well planned from the ground up and tested before a collection is permanently housed in the space. Control and stability of both temperature and relative humidity should be the primary objective for a consistent storage or exhibition environment that meets the requirements of the artifacts in the collection.[4]

As outlined above, the New Hampshire Historical Society had to examine the nature and behavior of its historic headquarters and to decide upon reasonable goals to protect the collections within it. The building itself is the most significant single object in the collections and had to be protected from adverse conditions resulting from attempts to modify its interior environment. The Northeast Document Conservation Center report cited reasonable parameters for paper collections, which constitute the bulk of collections stored within the Society's building:

> The National Information Standards Organization (accredited by ANSI) issued Technical Report No.1 "*Environmental Guidelines for the Storage of Paper Records*," in 1995. The report discusses a number of issues related to environmental controls and the storage of paper-based objects. The report recommends a maximum temperature set point of 70° F and a humidity range of 30% - 50% RH for the "user area" not to exceed a short-term spike of 60%.[5]

The project's consulting environmental engineer, Ernest Conrad, P. E., echoed these suggested parameters. Conrad recommended establishing environmental set points for each of the four seasons, starting with a goal of wintertime minimum relative humidity (RH) of not less than 30%, and more likely with a set point of 40% RH. During summer weather extremes, the goal was to allow RH to reach a maximum of 55% at room temperatures of 75 degrees F.[6]

A comparison between the conditions within the building during the same period in 2014-5 (before the project was completed), and in 2015-6 (the monitoring phase of the project), illustrates the outcome of the work:

---

[4] Michael K. Lee, "Environmental Assessment of the New Hampshire Historical Society Library Building," Northeast Document Conservation Center, November 29, 2013, p. 7.

[5] Wilson, William K. *Environmental Guidelines for the Storage of Paper Records*. NISO TR01-1995, NISO Press, Bethesda, Maryland. pg. 2, table 1, quoted in Michael K. Lee, "Environmental Assessment of the New Hampshire Historical Society Library Building," Northeast Document Conservation Center, November 29, 2013, p. 5.

[6] Letter, Conrad Engineers to William Dunlap, President, New Hampshire Historical Society, November 16, 2015. For a general statement of the climate control capacity of older buildings, see Ernest A. Conrad, P. E., "The Realistic Preservation Environment," 14th Annual NARA [National Archives and Records Administration] Preservation Conference, March 1999. (Online at: http://www.archives.gov/preservation/storage/realistic-preservation-environment.html)

Book Stacks, Second Story, West Side:

10/01/14 - 09/30/15:	10/01/15 – 09/30/16:
60-88°F., 10-64% RH	66-69°F., 30-55% RH

Main Exhibition Gallery, Second Story, East Side:

10/01/14 - 09/30/15:	10/01/15 – 09/30/16:
55-84°F., 8-82% RH	66-74°F., 30-54% RH

Main Library Reading Room, First Story, West Side:

10/01/14 - 09/30/15:	10/01/15 – 09/30/16:
61-80°F., 5-73% RH	67-71°F., 27-55% RH

Manuscripts Collections Storage, Basement, West Side:

10/01/14 - 09/30/15:	10/01/15 – 09/30/16:
62-83°F., 4-50% RH	66-70°F., 30-58% RH

In addition to attaining temperature and relative humidity conditions that accord well with the recommendations of the National Information Standards Organization's "*Environmental Guidelines for the Storage of Paper Records*," this project has greatly improved the energy efficiency of the 1911 building. During the year of calibration and testing, the carbon "footprint" of the Society's building dropped from approximately 220 tons of CO^2 per year to approximately 50 tons per year—a reduction of 77%—with a corresponding reduction in the cost of heating and cooling the building. Savings in fuel expenses will allow the Society to apply financial resources toward humanities programming and conservation of the collections rather than toward utility bills, contributing to the sustainability of the organization, the preservation of its collections, and the furtherance of its mission.